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Canada
United States
Spruce Budworms
Program

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The Spruce Budworm Program in the West

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Forests throughout the western United States and British Columbia have suffered widespread damage over the past several decades from persistent infestations of the western spruce budworm (*Choristoneura occidentalis* Freeman) and, to a lesser extent, the Modoc budworm (*C. viridis* Freeman). During this time, the infested area has fluctuated between four and six and one half million acres.

Tree species susceptible to western spruce budworm damage include Douglas-fir, true firs, western larch and Engelmann spruce. Young larvae damage the trees when they begin feeding in the spring on buds and new shoots. Only new foliage is eaten; at first only a portion of the needle may be chewed, leaving the rest to die and turn brown. Later, as the larvae grow larger they consume the entire needle. In heavily infested areas trees take on a reddish cast by mid to late July. When heavy budworm populations persist for three to five years, tree crowns become thin and grey, and weaker trees begin to die.

The most serious result of an infestation is usually a marked loss of growth in merchantable timber. In the past, aerial application of various insecticides has been the usual response to the economic threat posed by the western spruce budworm. However, a careful blend of techniques—for example, thinning of slow-growing stands followed by spraying of heavily infested areas—is often more successful in regulating pest populations. The development of this approach, that is, integrating management of the host with management of the pest, is the mission of a research and development program in the western United States and Canada.

The Canada/US Spruce Budworms Program—West (CANUSA—West) is one component of an international effort providing a unique opportunity to focus the resources and expertise of both Canada and the United States on a forest pest problem of concern to both nations.

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Figure 1 Parasitized western spruce budworm larva. (cover photo)

CATALOGING = PREP.

The six year effort, initiated in early 1978, is organized and operated as an international research, development and applications program. It will first design and then test spruce budworm control strategies and forest management strategies which will provide forest resource managers with the capability of reducing budworm damage without undue cost or impact on the environment.

Planning teams composed of scientists, pest control specialists and land managers have identified six target areas of research and development work to more sharply define the overall effort. Specific objectives have been set under each target to best meet the needs of forest managers within the allotted time and budget. Scientists at universities, State forestry organizations, private research groups, the Canadian Forestry Service, British Columbia Forest Service and the USDA Forest Service will be cooperating during the life of the Program to find answers to the many perplexing questions land managers face in dealing with the western budworms.

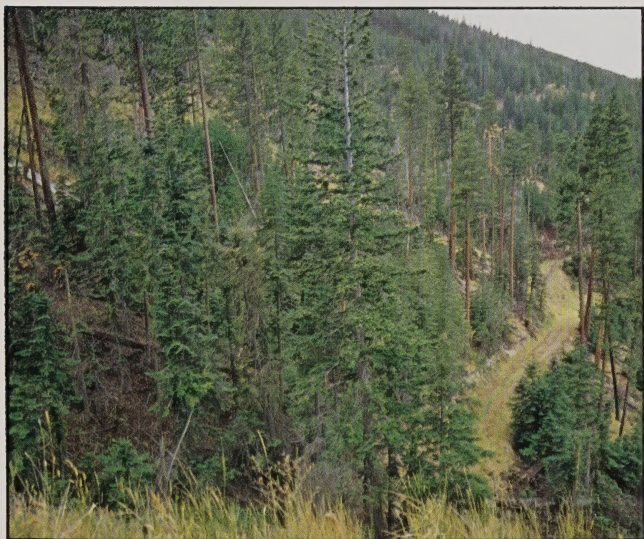


Figure 2 Existing management practices, such as thinning, may prove effective in reducing damage.

Target 1—Study the Insect

Learning more about the insect and its behavior will allow development of better techniques for predicting damage and the results of various treatment alternatives. Emphasis will be on sampling procedures to forecast populations and resultant damage, spruce budworm genetics, effects of weather on budworm survival, and spread of outbreaks.

Target 2—Study the Host Trees

A wide range of studies will be conducted to develop methods for rating the hazard a given stand faces from the western spruce budworm, and to improve computer models that simulate the growth of stands. Particular attention will be given to the effect of budworms on the establishment and regeneration of stands after harvest. Stand changes caused by budworm defoliation alone, and by budworm infestations acting in concert with other insects, diseases and fire will be assessed and incorporated into the models. The economic and environmental consequences of tree damage and of various treatment strategies managers might employ can then be evaluated.



Figure 3 Shingled egg mass on underside of needle; newly hatched larva.

Target 3—Understand the Damage to Find the Costs

A spruce budworm infestation, and the forest manager's response to it, may affect many facets of the forest resource, as well as future management plans. A better understanding of effects on timber and range productivity, wildlife, water, changes in risk of fire, and influences on recreation use will help resource managers make more reasoned decisions when confronted with potential budworm damage and the economic gains or losses it might produce in each of these resource values. Budworm influences on supply and demand in established markets will also be investigated.



Figure 4 Budworm damage can alter scenic and recreation values.

Target 4—Develop Methods to Prevent or Suppress Damage

The most effective way of regulating western spruce budworm populations may prove to be better forest management—manipulating the forest so that it is less vulnerable to damage. While exploration of this approach may find long-term management techniques, short-term protective measures must be developed too. Direct treatments such as microbial and chemical insecticides will be tested for protecting individual trees in urban settings as well as over relatively large areas of forest. Special techniques needed for protecting cone crops and campgrounds will also be developed. Innovative suppression techniques (like the use of female sex attractant, or pheromone, applications to confuse male budworms attempting to find a mate) will be evaluated.



Figure 5 New control techniques, such as mating disruption, will be evaluated.

Target 5—Understand the Environmental Effects of Suppression Actions

Before resource managers can make good decisions involving use of insecticides, they need to be aware of the effects of those insecticides on the environment. Studies will be conducted to discover the fate of insecticides in the forest, and what they do to selected examples of aquatic and terrestrial forest life.

Target 6—Develop a Pest Management System for the Western Spruce Budworm

The information and insights gained under targets 1-5 will be melded into a pest and resource management system that will give resource managers a number of options to choose from and the ability to evaluate the effectiveness and impacts of the available alternatives.

Also emphasized under target 6 will be delivery of budworm information from the Program to those who need it in forms most useful to them.



Figure 6 Deposits of insecticidal sprays, and their effects on aquatic and terrestrial life, will be investigated.

Cooperators

United States

Brigham Young University
University of California (Berkeley, Davis)
Colorado State University
University of Idaho
University of Missouri
University of New Mexico
Oregon State University
Washington State University
USDA Forest Service
 Intermountain Forest and Range Experiment Station
 Pacific Northwest Forest and Range Experiment Station
 Rocky Mountain Forest and Range Experiment Station
 Pacific Southwest Forest and Range Experiment Station
State and Private Forestry
 Forest Insect and Disease Management,
 Regions 1, 2, 3, 4, 6
 Methods Application Group
 Missoula Equipment Development Center
National Forest System
 Timber Management, Regions 1, 4, 6

Canada

Canadian Forestry Service
 Pacific Forest Research Centre
British Columbia Forest Service
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